

SEQUENCE LISTING

<110> Cahoon, Rebecca E.
Hitz, William D.
Thorpe, Catherine J.
Tingey, Scott V.

<120> PHYTIC ACID BIOSYNTHETIC ENZYMES

<130> BB1165 US NA

<140> 09/686,522

<141> 2000-10-11

<150> 60/082,960

<151> 1998-04-24

<150> PCT/US99/08790

<151> 1999-04-22

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<212> DNA

<213> Oryza sativa

<400> 1

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<210> 2

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<212> PRT

<213> Oryza sativa

<400> 2

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      20              25              30

His Lys Gly Gln Val Asp Leu Val Thr Glu Thr Asp Lys Ala Cys Glu
      35              40              45

Asp Leu Ile Phe Asn His Leu Arg Lys His Tyr Pro Asp His Lys Phe
      50              55              60

Ile Gly Glu Glu Thr Ser Ala Gly Leu Gly Ala Thr Ala Asp Leu Thr
      65              70              75              80

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Asp Asp Pro Thr Trp Ile Val Asp Pro Leu Asp Gly Thr Thr Asn Phe
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Lys Ile
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<211> 561
<212> DNA
<213> Glycine max

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tcacaattgg aaaaatctac aattggtgtt gtatacaatc aatataatga cttttctgga 480
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<212> PRT
<213> Glycine max

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 35 40 45
 Lys Ala Cys Glu Glu Leu Ile Phe Asn His Leu Lys Gln Leu Tyr Pro
 50 55 60
 Thr His Lys Phe Ile Gly Glu Glu Thr Thr Ala Ala Tyr Gly Thr Thr
 65 70 75 80
 Glu Leu Thr Asp Glu Pro Thr Trp Ile Val Asp Pro Leu Asp Gly Thr
 85 90 95
 Thr Asn Phe Val His Gly Phe Pro Phe Val Cys Val Ser Ile Gly Leu
 100 105 110
 Thr Ile Gly Lys Thr Pro Thr Ile Gly Val Val Tyr Asn Pro Ile Ile
 115 120 125
 Asn Glu Leu Phe Thr Gly Ile His Gly Lys Gly Ala Phe Leu Asn Gly
 130 135 140
 Asn Pro Ile Lys Val Ser Ser Gln Thr Glu Leu Ile Ser Ser Leu Leu
 145 150 155 160
 Ala Thr Glu Ala Gly Thr Lys Arg
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 <213> Glycine max

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 20 25 30
 Val Val Phe Asp Pro Ser Gly Ala Asp Phe Ala Ile Thr Ser Gln Arg
 35 40 45
 Val Ala Val Ser Asn Pro Phe Xaa Lys Asp Glu Leu Val Glu Thr Arg
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 Arg Lys Met Gly Trp Glu Ile Tyr Asn
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<210> 7
 <211> 1003
 <212> DNA
 <213> Triticum aestivum

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 agggccaggt ggatttggtg acggagacgg acaaggcatg cgaggatctc atcttcaacc 180
 acctccgat gctctaccg gaccacaagt tcatcggcga ggagacgtct gcagccctcg 240
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<210> 8
 <211> 267
 <212> PRT
 <213> Triticum aestivum

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 Ala Gly Glu Ile Ile Arg Lys Ser Phe Tyr Leu Ser Lys Lys Val Glu
 20 25 30
 His Lys Gly Gln Val Asp Leu Val Thr Glu Thr Asp Lys Ala Cys Glu
 35 40 45
 Asp Leu Ile Phe Asn His Leu Arg Met Leu Tyr Pro Asp His Lys Phe
 50 55 60
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aaaaaaaaaa

1090

<210> 10

<211> 249

<212> PRT

<213> Hordeum vulgare

<400> 10

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20 25 30

Asp Ser Leu Ser Glu Tyr Leu Trp Cys Ile Asp Pro Leu Asp Gly Thr
35 40 45

Thr Asn Phe Ala His Gly Tyr Pro Ser Phe Ser Val Ser Ile Gly Val
50 55 60

Leu Tyr Arg Gly Lys Pro Ala Ala Ala Thr Val Val Glu Phe Cys Gly
65 70 75 80

Gly Pro Met Cys Trp Ser Thr Arg Thr Ile Ser Ala Ser Ser Gly Lys
85 90 95

Gly Ala Tyr Cys Asn Gly Gln Lys Ile His Val Ser Pro Thr Glu Lys
100 105 110

Val Glu Gln Ser Leu Leu Val Thr Gly Phe Gly Tyr Glu His Asp Asp
115 120 125

Ala Trp Leu Thr Asn Ile Asn Leu Phe Lys Glu Phe Thr Asp Val Ser
130 135 140

Arg Gly Val Arg Arg Leu Gly Ser Ala Ala Ala Asp Met Ser His Val
145 150 155 160

Gly Leu Gly Ile Thr Glu Ala Tyr Trp Glu Tyr Arg Leu Lys Pro Trp
165 170 175

Asp Met Ala Ala Gly Val Leu Ile Val Glu Glu Ala Gly Gly Val Val
180 185 190

Thr Arg Met Asp Gly Gly Glu Phe Thr Val Phe Asp Arg Ser Val Leu
195 200 205

Val Ser Asn Gly Val Val His Asp Gln Leu Leu Glu Arg Ile Arg Pro
210 215 220

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Lys Pro Asp Lys Tyr Pro Thr Asp Phe
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<210> 11

<211> 989

<212> DNA

<213> Zea mays

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<210> 12
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<212> PRT
<213> Zea mays

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Tyr Tyr Ile Gly Gln Arg Ile His Val Ser Gln Thr Asp Lys Val Glu
          20              25              30

Gln Ser Leu Leu Val Thr Gly Phe Gly Tyr Glu His Asp Asp Ala Trp
          35              40              45

Thr Thr Asn Met Asn Leu Phe Lys Glu Phe Thr Asp Ile Ser Arg Gly
          50              55              60

Val Arg Arg Leu Gly Ser Ala Ala Ala Asp Met Ser His Ile Gly Leu
          65              70              75              80

Gly Ile Thr Glu Ala Tyr Trp Glu Tyr Arg Leu Lys Pro Trp Asp Val
          85              90              95

His Ala Gly Val Leu Ile Val Glu Glu Ala Gly Gly Val Val Thr Arg
          100              105              110

Met Asp Gly Gly Glu Phe Thr Val Phe Asp Arg Ser Val Leu Val Ser
          115              120              125

Asn Gly Leu Val His Gly Gln Val
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<210> 13
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<212> DNA
<213> Zea mays

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ttggngaaga ga 492

<210> 14
<211> 338
<212> PRT
<213> Zea mays

<400> 14
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Arg Ala Ala Ser Pro Val Ser Ser Ala Val Leu Ser Ala Ser Gly Arg
35 40 45
Gln Pro Met Ser Thr Val Arg Ala Ser Phe Ala Ala Gly Ala Ala Gly
50 55 60
Arg Arg Ala Ala Ala Val Gly Glu Leu Ala Thr Glu Arg Leu Val Glu
65 70 75 80
Val Ala Gln Arg Ala Ala Asp Ala Ala Gly Glu Val Leu Arg Lys Tyr
85 90 95
Phe Arg Gln Arg Val Glu Ile Ile Asp Lys Glu Asp His Ser Pro Val
100 105 110
Thr Ile Ala Asp Arg Glu Ala Glu Glu Ala Met Val Ser Val Ile Leu
115 120 125
Lys Ser Phe Pro Thr His Ala Ile Phe Gly Glu Glu Asn Gly Trp Arg
130 135 140
Cys Ala Glu Asn Ser Ala Asp Phe Val Trp Val Leu Asp Pro Ile Asp
145 150 155 160

Gly Thr Lys Ser Phe Ile Thr Gly Lys Pro Leu Phe Gly Thr Leu Ile
 165 170 175
 Ala Leu Leu His Asn Gly Lys Pro Val Ile Gly Val Ile Asp Gln Pro
 180 185 190
 Ile Leu Arg Glu Arg Trp Ile Gly Val Asp Gly Lys Gln Thr Thr Leu
 195 200 205
 Asn Gly Gln Glu Ile Ser Val Arg Ser Cys Asn Leu Leu Ala Gln Ala
 210 215 220
 Tyr Leu Tyr Thr Thr Ser Pro His Leu Phe Glu Ala Asp Ala Glu Asp
 225 230 235 240
 Ala Phe Ile Arg Val Arg Asn Lys Val Lys Val Pro Leu Tyr Gly Cys
 245 250 255
 Asp Cys Tyr Ala Tyr Ala Leu Leu Ala Ser Gly Phe Val Asp Ile Val
 260 265 270
 Val Glu Ser Gly Leu Lys Pro Tyr Asp Phe Leu Ser Leu Val Pro Val
 275 280 285
 Ile Glu Gly Ala Gly Gly Ser Ile Thr Asp Trp Arg Gly Asp Lys Leu
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Trp Arg

<210> 15
 <211> 593
 <212> DNA
 <213> Oryza sativa

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<210> 16
 <211> 142
 <212> PRT
 <213> Oryza sativa

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 His Glu Leu Thr Lys Val Glu Gln Ser Leu Leu Val Thr Gly Phe Gly

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Tyr Thr Asp Ile Ser Arg Gly Val Arg Arg Leu Gly Ser Ala Ala Ala	35	40	45
Asp Met Ser His Val Ala Leu Gly Ile Thr Glu Ala Tyr Trp Glu Tyr	50	55	60
Arg Leu Lys Pro Trp Asp Met Ala Ala Gly Val Leu Ile Val Glu Glu	65	70	75
Ala Gly Gly Met Val Ser Arg Met Asp Gly Gly Glu Phe Thr Val Phe	85	90	95
Asp Arg Ser Val Leu Val Ser Asn Gly Val Val His Asp Gln Leu Leu	100	105	110
Asp Arg Ile Gly Pro Ala Thr Glu Asp Leu Lys Lys Lys Gly Ile Asp	115	120	125
Phe Ser Leu Trp Phe Lys Pro Asp Lys Tyr Pro Thr Asp Phe	130	135	140

<210> 17
 <211> 1103
 <212> DNA
 <213> Glycine max

<400> 17
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<210> 18
 <211> 295
 <212> PRT
 <213> Glycine max

<400> 18
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 35 40 45
 Val Ile Arg Lys Tyr Phe Arg Lys Asn Phe Asp Val Ile His Lys His
 50 55 60
 Asp Leu Ser Pro Val Thr Ile Ala Asp Gln Ser Ala Glu Glu Ala Met
 65 70 75 80
 Val Ser Ile Ile Leu Asp Asn Phe Pro Ser His Ala Ile Tyr Gly Glu
 85 90 95
 Glu Asn Gly Trp Arg Cys Glu Glu Lys Asn Ala Asp Tyr Val Trp Val
 100 105 110
 Leu Asp Pro Ile Asp Gly Thr Lys Ser Phe Ile Thr Gly Lys Pro Val
 115 120 125
 Phe Gly Thr Leu Val Ala Leu Leu Gln Asn Gly Thr Pro Ile Leu Gly
 130 135 140
 Ile Ile Asp Gln Pro Val Leu Arg Glu Arg Trp Ile Gly Ile Ala Gly
 145 150 155 160
 Lys Arg Thr Ser Leu Asn Gly Gln Glu Ile Ser Thr Arg Thr Cys Ala
 165 170 175
 Asp Leu Ser Gln Ala Tyr Leu Tyr Thr Thr Ser Pro His Leu Phe Asn
 180 185 190
 Gly Asp Ala Glu Glu Ala Phe Ile Arg Val Arg Ser Lys Val Lys Phe
 195 200 205
 Gln Leu Tyr Gly Cys Asp Cys Tyr Ala Tyr Ala Leu Leu Ser Ser Gly
 210 215 220
 Phe Val Asp Leu Val Val Glu Ser Gly Leu Lys Pro Tyr Asp Phe Leu
 225 230 235 240
 Ala Leu Ile Pro Val Ile Glu Gly Ala Gly Gly Val Ile Thr Asp Trp
 245 250 255
 Lys Gly Asp Lys Leu Phe Trp Glu Ala Ser Pro Leu Ser Ile Ala Thr
 260 265 270
 Ser Phe Asn Val Val Ala Ala Gly Asp Lys Gln Ile His Gln Gln Ala
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 Leu Asp Ser Leu Gln Trp Lys
 290 295

<210> 19

<211> 1418

<212> DNA

<213> Triticum aestivum

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<400> 19
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aaaaaaaaaa aaaaaacaaa aaaaaaaata aaaaaaaaaa aaaacccccg gggggggggc 1260
ggggaccaa tttcccata tttttttttt ttttaccccc cccagggggg gtttttttta 1320
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ccccctttcc ccaagggggg taataaaaaa aagggccg 1418

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<210> 20
<211> 324
<212> PRT
<213> Triticum aestivum

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      20             25             30

Gly Arg Trp Met Gly Ser Val Arg Ala Ser Pro Ser Glu Ala Gly Gly
      35             40             45

Trp Ala Val Ala Ala Ala Gly Lys Glu Gly Val Asp Met Glu Arg Leu
      50             55             60

Val Ala Val Ala Gln Ser Ala Ala Asp Ala Ala Gly Glu Val Leu Arg
      65             70             75             80

Lys Tyr Phe Arg Gln Arg Phe Glu Ile Ile Asp Lys Glu Asp His Ser
      85             90             95

Pro Val Thr Ile Ala Asp Arg Glu Ala Glu Glu Ala Met Thr Ser Val
      100            105            110

Ile Leu Lys Ser Phe Pro Thr His Ala Val Phe Gly Glu Glu Asn Gly
      115            120            125

Trp Arg Cys Ala Glu Lys Ser Ala Asp Tyr Val Trp Val Leu Asp Pro
      130            135            140

Ile Asp Gly Thr Lys Ser Phe Ile Thr Gly Lys Pro Leu Phe Gly Thr

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145 150 155 160
 Leu Ile Ala Leu Leu His Asn Gly Lys Pro Val Met Gly Ile Ile Asp
 165 170 175
 Gln Pro Ile Leu Arg Glu Arg Trp Val Gly Val Asp Gly Lys Lys Thr
 180 185 190
 Thr Leu Asn Gly Gln Glu Ile Ser Val Arg Pro Cys Asn Val Leu Glu
 195 200 205
 Gln Ala Tyr Leu Tyr Thr Thr Ser Pro His Leu Phe Glu Gly Asp Ala
 210 215 220
 Glu Asp Ala Phe Ile Arg Val Arg Asp Lys Val Lys Val Pro Leu Tyr
 225 230 235 240
 Gly Cys Asp Cys Tyr Ala Tyr Ala Leu Leu Ala Ser Gly Phe Val Asp
 245 250 255
 Leu Val Val Glu Ser Gly Leu Lys Pro Tyr Asp Phe Leu Ser Leu Val
 260 265 270
 Pro Val Ile Glu Gly Ala Gly Gly Ser Ile Thr Asp Trp Glu Gly Asn
 275 280 285
 Lys Leu His Trp Pro Val Ser Ser Glu Ser Arg Pro Thr Ser Phe Asn
 290 295 300
 Val Val Ala Ala Gly Asp Ser His Val His Gly Gln Ala Leu Ala Ala
 305 310 315 320
 Leu Arg Trp Arg

<210> 21
 <211> 273
 <212> PRT
 <213> Lycopersicon esculentum

<400> 21
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 35 40 45
 Lys Ala Cys Glu Asp Leu Ile Phe Asn His Leu Lys Gln His Phe Pro
 50 55 60
 Ser His Lys Phe Ile Gly Glu Glu Thr Ser Ala Ala Thr Gly Asp Phe
 65 70 75 80
 Asp Leu Thr Asp Glu Pro Thr Trp Ile Val Asp Pro Val Asp Gly Thr
 85 90 95
 Thr Asn Phe Val His Gly Phe Pro Ser Val Cys Val Ser Ile Gly Leu

100					105					110					
Thr	Ile	Gly	Lys	Ile	Pro	Thr	Val	Gly	Val	Val	Tyr	Asp	Pro	Ile	Ile
		115					120					125			
Asp	Glu	Leu	Phe	Thr	Gly	Ile	Asn	Gly	Lys	Gly	Ala	Tyr	Leu	Asn	Gly
	130					135					140				
Lys	Pro	Ile	Lys	Val	Ser	Ser	Gln	Ser	Glu	Leu	Val	Lys	Ser	Leu	Leu
	145					150					155				160
Gly	Thr	Glu	Val	Gly	Thr	Thr	Arg	Asp	Asn	Leu	Thr	Val	Glu	Thr	Thr
				165					170					175	
Thr	Arg	Arg	Ile	Asn	Asn	Leu	Leu	Phe	Lys	Val	Arg	Ser	Leu	Arg	Met
			180					185					190		
Cys	Gly	Ser	Cys	Ala	Leu	Asp	Leu	Cys	Trp	Val	Ala	Cys	Gly	Arg	Leu
		195					200					205			
Glu	Leu	Phe	Tyr	Leu	Ile	Gly	Tyr	Gly	Gly	Pro	Trp	Asp	Val	Ala	Gly
	210					215					220				
Gly	Ala	Val	Ile	Val	Lys	Glu	Ala	Gly	Gly	Val	Leu	Phe	Asp	Pro	Ser
	225					230					235				240
Gly	Ser	Glu	Phe	Asp	Ile	Thr	Ser	Gln	Arg	Val	Ala	Ala	Thr	Asn	Pro
				245					250					255	
His	Leu	Lys	Glu	Ala	Phe	Val	Glu	Ala	Leu	Gln	Leu	Ser	Glu	Tyr	Val
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Ser

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 <212> PRT
 <213> Lycopersicon esculentum

<400> 22
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 Lys His Val Glu His Lys Gly Met Val Asp Leu Val Thr Glu Thr Asp
 35 40 45
 Lys Ala Cys Glu Asp Phe Ile Phe Asn His Leu Lys Gln Arg Phe Pro
 50 55 60
 Ser His Lys Phe Ile Gly Glu Glu Thr Thr Ala Ala Cys Gly Asn Phe
 65 70 75 80
 Glu Leu Thr Asp Glu Pro Thr Trp Ile Val Asp Pro Leu Asp Gly Thr
 85 90 95
 Thr Asn Phe Val His Gly Phe Pro Phe Val Cys Val Ser Ile Gly Leu

100					105					110						
Thr	Ile	Glu	Lys	Lys	Pro	Thr	Val	Gly	Val	Val	Tyr	Asn	Pro	Ile	Ile	
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Asp	Glu	Leu	Phe	Thr	Gly	Ile	Asp	Gly	Lys	Gly	Ala	Phe	Leu	Asn	Gly	
130					135					140						
Lys	Pro	Ile	Lys	Val	Ser	Ser	Gln	Ser	Glu	Leu	Val	Lys	Ala	Leu	Leu	
145					150					155					160	
Ala	Thr	Glu	Ala	Gly	Thr	Asn	Arg	Asp	Lys	Leu	Val	Val	Asp	Ala	Thr	
165					170					175						
Thr	Gly	Arg	Ile	Asn	Ser	Leu	Leu	Phe	Lys	Val	Arg	Ser	Leu	Arg	Met	
180					185					190						
Cys	Gly	Ser	Cys	Ala	Leu	Asn	Leu	Cys	Gly	Val	Ala	Cys	Gly	Arg	Leu	
195					200					205						
Asp	Leu	Phe	Tyr	Glu	Leu	Glu	Phe	Gly	Gly	Pro	Trp	Asp	Val	Ala	Gly	
210					215					220						
Gly	Ala	Val	Ile	Val	Lys	Glu	Ala	Gly	Gly	Phe	Val	Phe	Asp	Pro	Ser	
225					230					235					240	
Gly	Ser	Glu	Phe	Asp	Leu	Thr	Ala	Arg	Arg	Val	Ala	Ala	Thr	Asn	Ala	
245					250					255						
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260					265											
<210> 23																
<211> 287																
<212> PRT																
<213> Synechocystis sp.																
<400> 23																
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Trp	Leu	Glu	Ile	Ala	Thr	Glu	Ala	Val	Leu	Ala	Ala	Gly	Ala	Glu	Ile	
20					25					30						
Phe	Ser	Leu	Trp	Gly	Lys	Val	Gln	Gln	Ile	Gln	Glu	Lys	Gly	Arg	Ala	
35					40					45						
Gly	Asp	Leu	Val	Thr	Glu	Ala	Asp	Arg	Gln	Ala	Glu	Ala	Ile	Ile	Leu	
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Glu	Ile	Ile	Lys	Arg	Arg	Cys	Pro	Asp	His	Ala	Ile	Leu	Ala	Glu	Glu	
65					70					75					80	
Ser	Gly	Gln	Leu	Gly	Gln	Val	Asp	Asn	Pro	Phe	Cys	Trp	Ala	Ile	Asp	
85					90					95						
Pro	Leu	Asp	Gly	Thr	Thr	Asn	Phe	Ala	His	Ser	Tyr	Pro	Val	Ser	Cys	
100					105					110						
Val	Ser	Ile	Gly	Leu	Leu	Ile	Gln	Asp	Ile	Pro	Thr	Val	Gly	Val	Val	

115					120					125					
Tyr	Asn	Pro	Phe	Arg	Gln	Glu	Leu	Phe	Arg	Ala	Ala	Thr	Ser	Leu	Gly
130					135					140					
Ala	Thr	Leu	Asn	Arg	Arg	Pro	Ile	Gln	Val	Ser	Thr	Thr	Ala	Ser	Leu
145					150					155					160
Asp	Lys	Ser	Leu	Leu	Val	Thr	Gly	Phe	Ala	Tyr	Asp	Arg	Val	Lys	Thr
				165					170					175	
Leu	Asp	Asn	Asn	Tyr	Pro	Glu	Phe	Cys	Tyr	Leu	Thr	His	Leu	Thr	Gln
			180					185					190		
Gly	Val	Arg	Arg	Ser	Gly	Ser	Ala	Ala	Ile	Asp	Leu	Ile	Asp	Val	Ala
		195					200					205			
Cys	Gly	Arg	Leu	Asp	Gly	Tyr	Trp	Glu	Arg	Gly	Ile	Asn	Pro	Trp	Asp
210					215					220					
Met	Ala	Ala	Gly	Ile	Val	Ile	Val	Arg	Glu	Ala	Gly	Gly	Ile	Val	Ser
225					230					235					240
Ala	Tyr	Asp	Cys	Ser	Pro	Leu	Asp	Leu	Ser	Thr	Gly	Arg	Ile	Leu	Ala
				245					250					255	
Thr	Asn	Gly	Lys	Ile	His	Gln	Glu	Leu	Ser	Gln	Ala	Leu	Ala	Ala	Thr
			260					265					270		
Pro	Gln	Trp	Phe	Gln	Gln	Tyr	Ala	Ala	Ala	Arg	Ala	Gln	Lys	Ile	
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<211> 267															
<212> PRT															
<213> Synechocystis sp.															
<400> 24															
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Ala	Val	Ser	Gly	Glu	Ile	Leu	Ile	Gln	Tyr	Phe	Arg	Arg	Ser	His	Leu
			20					25					30		
Gln	Gly	Gly	Thr	Lys	Ile	Asp	Gln	Val	Ser	Ala	Ile	Val	Thr	Gln	Ala
		35					40					45			
Asp	Glu	Glu	Ala	Glu	Gln	Ala	Met	Val	Asp	Leu	Ile	Gln	Ala	Gln	Phe
	50					55					60				
Pro	Gln	Asp	Gly	Val	Ile	Arg	Glu	Glu	Gly	Lys	Asn	Ile	Ala	Gly	Lys
	65					70					75				80
Ser	Gly	Tyr	Thr	Trp	Val	Leu	Asp	Pro	Ile	Asp	Gly	Thr	Ser	Ser	Phe
				85					90					95	
Val	Arg	Gly	Leu	Pro	Ile	Phe	Ala	Thr	Leu	Ile	Gly	Leu	Val	Asp	Ala
			100					105					110		
Asp	Met	Arg	Pro	Val	Leu	Gly	Ile	Ala	His	Gln	Pro	Ile	Ser	Gly	Asp

	115					120					125					
Arg	Trp	Gln	Gly	Val	Gln	Gly	Glu	Gln	Ser	Asn	Val	Asn	Gly	Ile	Pro	
	130					135					140					
Leu	Val	Asn	Pro	Tyr	Lys	Ala	Ser	Glu	Ile	Asn	Leu	Thr	Ala	Ala	Cys	
145					150					155					160	
Ile	Val	Ser	Thr	Thr	Pro	Leu	Met	Phe	Thr	Thr	Pro	Val	Gln	Gln	Gln	
				165					170					175		
Lys	Met	Ala	Asp	Ile	Tyr	Arg	Gln	Cys	Gln	Arg	Thr	Ala	Phe	Gly	Gly	
			180					185					190			
Asp	Cys	Phe	Asn	Tyr	Leu	Ser	Ala	Ala	Ser	Gly	Trp	Thr	Ala	Met	Pro	
		195					200					205				
Leu	Val	Ile	Val	Glu	Ala	Asp	Leu	Asn	Phe	Tyr	Asp	Phe	Cys	Ala	Leu	
	210					215					220					
Ile	Pro	Ile	Leu	Thr	Gly	Ala	Asn	Tyr	Cys	Phe	Thr	Asp	Trp	Gln	Gly	
225					230					235					240	
Lys	Glu	Leu	Thr	Pro	Glu	Ser	Thr	Glu	Val	Val	Ala	Ser	Pro	Asn	Pro	
				245					250					255		
Lys	Leu	His	Ser	Glu	Ile	Leu	Ala	Phe	Leu	Gln						
			260					265								